REMARKS/ARGUMENTS

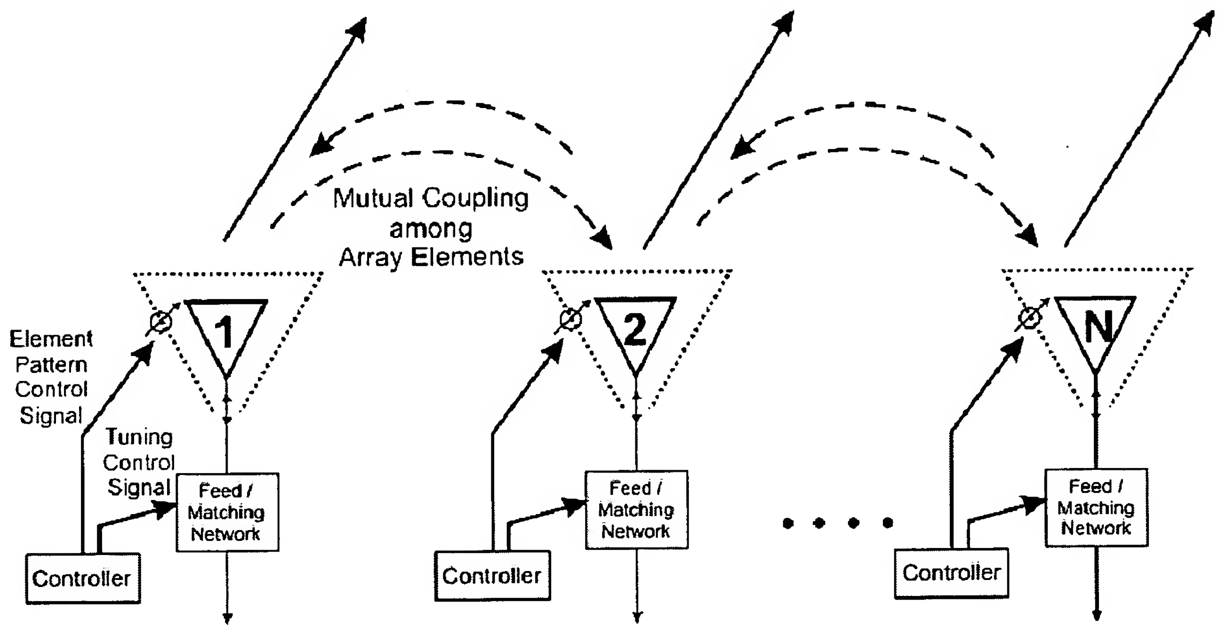
Reconsideration of this application is respectfully requested.

The originally filed application papers for this case included a transmittal sheet under 37 C.F.R. §1.53(b) which, *inter alia*, incorporated the entire content of parent application No. 10/206,101 filed July 29, 2002 into this present continuation-in-part application. That express incorporation by reference has now been re-iterated in the first paragraph of the specification which includes the related priority claim under 35 U.S.C. §120.

As explained in the specification, this present application is directed to an array of the individual radiating antenna element structures described and claimed in parent US Patent No. 6,876,337. As also explained in the introductory portion of the specification, introducing such re-configurability at the individual antenna element level of an array leads to the possibility of higher performance in gain, pattern shaping and frequency agility to the overall array performance. For example, see paragraphs [0009] through [0013] of the specification.

When one builds a phased array of N elements it is normal practice to make all N elements to be the same. Unfortunately, all of the elements in the array interact with all of the other elements in the array. This is usually referred to as mutual coupling. This mutual coupling can have negative effects when the array is phased to be steered in certain directions. The mutual coupling among the elements can cause the array elements to lose tuning or to cause the beam to steer in a direction other than intended. This invention combines N individually reconfigurable elements (as patented in the parent '337 patent) into an array. Since each element can now be controlled via the reconfigurable parasitically controlled component, the tuning and pattern of

the individual elements can be modified to compensate for the mutual coupling. The diagram below demonstrates this principle.



As just noted, aperture loading can be used to modify the characteristics of antenna elements. This is accomplished by connecting variable impedance devices to load ports within the element aperture to change things such as the element pattern or polarization. Directly connecting the load ports to the driven element tends to change the tuning as the load impedance varies. This can be beneficial but has disadvantages when it is desired to operate at a particular frequency with changed radiated pattern properties.

The use of one or more loaded parasitics within the <u>element</u> aperture allows for pattern control without detuning the antenna element. For example, a standard loop element mounted on a ground plane might be tuned to 1.5 GHz. The element naturally has good end-fire gain but has poor gain in broadside. However a variable load may be used to change the pattern to provide a state where there is good broad-side gain. End loading the antenna can provide a broadside

beam but it has poor gain because the element becomes detuned at 1.5 GHz. The optimum broadside load for one such case has been found as a 92 nH inductor. A loaded parasitic within the active element works better. It provides a state with a broadside beam of substantial gain because the element remains tuned at 1.5 GHz. The optimum broadside load for this case is also a 19 nH inductor.

By the above amendment, applicant's claims now more particularly require the individual elements of the array to be small antenna elements of the type described in parent Patent No. 6,876,337: namely, each antenna element of the claimed array includes at least one active component and at least one reactively-controlled parasitic component co-located with the active component within an antenna element radiating aperture having a largest dimension of about one-half wavelength at the lowest frequency of its operational bandwidth. Each claimed antenna element of the array also includes at least one controllably variable reactance load connected to said at least one parasitic component within that antenna element aperture.

Similar amendments have been made to all independent claims 1, 3 and 5.

The rejection of claims 1-23 under 35 U.S.C. §103 as allegedly being made "obvious" based on the Gothard '456 reference is respectfully traversed.

Gothard primarily derives from the patents of Himmel (4,387,378), Black (3,725,938), and Gueguen (3,846,799). The Gothard approach is a variation on a theme of using a driven monopole and placing several parasitic monopoles around it (Gothard calls this an array) to parasitically direct or reflect the signal in the driven monopole (e.g., this is how the Yagi Uda antenna works). In these cases, the whole "array" is the collection of parasitic elements and the driven element. Applicant has claimed an array wherein each of plural elements in the array is

itself a collection of at least one driven small antenna element and associated configurable parasitic elements located within that element's own local radiation aperture. In parent patent 6,876,337, this single reconfigurable small antenna element is described in great detail. When plural such elements are arrayed synergistic effects also provide a substantially improved array performance – and that is the subject matter now being claimed.

Gothard's provision of but a single parasitic "array" (that is at least one driven element surrounded by parasitic elements) to produce a type of beam forming has long been known. The above amendments now emphasize that applicant's claimed parasitic elements are respectively located within corresponding apertures of each of plural small antenna active elements. Perhaps one way to visualize the claimed structure is an array of "arrays" – if each array element is going to be analogized to a Gothard "array".

The patentability of such individual small antenna radiating apertures vis-à-vis prior art like Gothard was established in applicant's parent '337 patent, e.g., see '337 claim 1:

> "A controlled parasitic antenna system having loaded parasitic elements within a radiating aperture of a small antenna element and having a largest dimension of about one-half wavelength at the lowest frequency of its operational band…"

This type of individual radiating aperture is thus patentably distinguished from all prior patents like Gothard which use one or more active elements in conjunction with conventionally spaced 'passive', i.e., parasitic, elements, which may or may not have controllable loads.

The point of the present application is the arraying of several of the small antenna radiating apertures claimed in the parent '337 patent so that a novel phased array is provided, i.e., a phased array that has properties not available with prior existing phased array technology.

Accordingly, this entire application is now believed to be in condition for allowance and a formal Notice to that effect is respectfully solicited.

Respectfully submitted,

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